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| 10/511,784 | 10/15/2004 | William R Priedeman JR. | S697.12-0065 | 4209 |
| 27367 7590 06/19/2009 WESTMAN CHAMPLIN & KELLY, P.A. SUITE 1400 900 SECOND AVENUE SOUTH MINNEAPOLIS, MN 55402 | | | | |
| EXAMINER | | | | |
| GOFF II, JOHN L | | | | |
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| 1791 | | | | |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/511,784

Applicant(s)

PRIEDEMAN ET AL.

Examiner

John L. Goff

Art Unit

1791

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 March 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5,8,10,11,16,18-23,27,28,33 and 43-49 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5,8,10,11,16,18-23,27,28,33 and 43-49 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 October 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 1/28/09
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 3/27/09 has been entered.
2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Objections

3. Claim 11 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 11 depends from claim 1. Claim 1, lines 3 and 4 require the object is built using a layered manufacturing rapid prototyping technique.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claim 16 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 16 as amended requires “re-exposing the object to the vapors of the solvent to transiently resoften the modeling material at the object surface”. It is unclear where in applicants specification a step of re-exposing the object to the vapors of the solvent to resoften the material is disclosed.

Claim Rejections - 35 USC § 103

6. Claims 1-3, 8, 10, 11, 16, 18, 19, 21, 22, 27, 28, 33, 43-45, and 47-49 are rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art (Specification pages 1-4 and 8) as exemplified in part by Crump (U.S. Patent 5,121,329) in view of Joseph et al. (U.S. Patent 3,807,054) or Edmonds (U.S. Patent 5,448,838).

The admitted prior art discloses it was known to make a three-dimensional object by building an object from a thermoplastic modeling material using fused deposition molding wherein the built object has an object surface formed of the modeling material including an object surface formed of a plurality of layers as exemplified by Crump (Page 1, line 6 - Page 2, line 15 of the specification and Column 3, lines 64-66 of Crump). The admitted prior art further teaches that due to the layered manufacturing process the object surface formed of the modeling material exhibits at least one surface effect the effect considered to extend substantially across an entirety of the object because the layers extend substantially across an entirety of the object. The

at least one surface effect such as a stair step effect, striation, or a surface roughness due to errors in building the object detracts aesthetically from the object wherein manual/by hand techniques were known for smoothing the object surface (Page 2, line 16 - Page 3, line 17 of the specification). It is extremely well known in the art that thermoplastic object surfaces formed as having a surface effect such as voids, cracks, scratches, and other surface roughness may be smoothed by exposing the object to vapors of a solvent such as methylene chloride that transiently softens the thermoplastic material at the object surface and reflows the softened thermoplastic material to uniformly smooth the object surface as shown by Joseph or Edmonds (Figure 6 and Column 1, lines 5-11 and Column 2, lines 3-11 and Column 4, lines 1-17 of Joseph and Figure 1 and Column 1, lines 6-14 and Column 2, lines 6-10 and 52-56 and Column 3, lines 1-8 of Edmonds), it being further noted the admitted prior art recognizes smoothing plastics with vapors of a solvent was known (Page 3, line 18 - Page 4, line 20 of the specification). It would have been obvious to one of ordinary skill in the art at the time the invention was made to smooth the object surface as taught by the admitted prior art as exemplified in part by Crump by using vapors of a solvent as was well known and shown by Joseph or Edmonds to easily and uniformly smooth the object surface across the entirety of the object without having to manually do so by hand.

Regarding claim 8, the length of time the object is exposed to the solvent vapors as taught by the admitted prior art as exemplified in part by Crump and as modified by Joseph or Edmonds must be selected as a function of the concentration of the solvent vapors prior to exposing the object otherwise the uniformly smooth object surface would not be formed. In the event it is shown the length of time is not necessarily selected as a function of the concentration of the

solvent vapors the following rejection would apply. It would have been obvious to one of ordinary skill in the art at the time the invention was made to select the length of time the object is exposed to the solvent vapors as taught by the admitted prior art as exemplified in part by Crump and as modified by Joseph or Edmonds as a function of the concentration of the solvent vapors prior to exposing the object such that when the object is removed from the solvent vapors the surface is uniformly smooth.

Regarding claims 10, 27, 28, and 49, the admitted prior art discloses known solvent masking substances include gum, waxes, pastes, adhesives or masking tape (Page 8, lines 24-26). It would have been obvious to one of ordinary skill in the art at the time the invention was made to include in the admitted prior art as exemplified in part by Crump and as modified by Joseph or Edmonds known solvent masking substances such as those shown by the admitted prior art as a function of inhibiting smoothing in areas where aesthetically surface roughness or other non-smoothing effect is desired wherein the specific technique for applying the substances which are similar to the thermoplastic molding material would have included the same fused deposition molding equipment as used to apply the thermoplastic molding material such that further equipment is not required.

Regarding claim 16, the admitted prior art as exemplified in part by Crump and as modified by Joseph or Edmonds is silent as to re-exposing the object to the vapors of the solvent. It would have been obvious to one of ordinary skill in the art at the time the invention was made to include in the admitted prior art as exemplified in part by Crump and as modified by Joseph or Edmonds a step of re-exposing the object to the vapors of the solvent to resoften and reflow the material in the event the first exposure of the object to the vapors does not uniformly smooth the

object surface across the entirety of the object or in the event the object surface is cracked, scratched, dented, or otherwise marred.

Regarding claim 18 and 48, the object taught by the admitted prior art as exemplified in part by Crump and as modified by Joseph or Edmonds is exposed the vapors of the solvent by suspending the object on a wire mesh within a chamber containing the vapors of the solvent in a manner that substantially allows the entirety of the object surface to be exposed to the vapors of the solvent as shown by Joseph (Column 2, lines 25-39). It is noted "suspending" is given its usual definition of to keep from falling as if by hanging. In the event it is shown the term "suspending" by itself requires the object to be hanging by an attachment above as opposed to as if by hanging the following rejection would apply. It would have been obvious to one of ordinary skill in the art at the time the invention was made place the object taught by the admitted prior art as exemplified in part by Crump and as modified by Joseph or Edmonds in the chamber containing the vapors of the solvent using any means of placing an object in a chamber such as by hanging from an attachment above the object or by sitting on an attachment below the object as both would achieve the same result.

7. Claims 4, 5, 23, and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art as exemplified in part by Crump and Joseph or Edmonds as applied to claims 1-3, 8, 10, 11, 16, 18, 19, 21, 22, 27, 28, 33, 43-45, and 47-49 above, and further in view of Dahlin et al. (U.S. Patent 6,022,207).

The admitted prior art as exemplified in part by Crump and Joseph or Edmonds teach all of the limitations in claims 4, 5, 23, and 46 except for a teaching of the specific thermoplastic material used, it being noted the admitted prior art makes reference to Dahlin as a known rapid

prototyping technique. Dahlin directed to rapid prototyping similar to the admitted prior art discloses a particularly suitable thermoplastic is ABS (Column 4, lines 3-4). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use as the thermoplastic material in the admitted prior art as exemplified in part by Crump and as modified by Joseph or Edmonds ABS a known suitable material such as shown by Dahlin.

8. Claims 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art as exemplified in part by Crump and Joseph or Edmonds as applied to claims 1-3, 8, 10, 11, 16, 18, 19, 21, 22, 27, 28, 33, 43-45, and 47-49 above, and further in view of Leyden et al. (U.S. Patent 5,143,663).

The admitted prior art as exemplified in part by Crump and Joseph or Edmonds teach all of the limitations in claim 20 except for a teaching of modifying an initial object representation to pre-distort certain features of the surface geometry, it being noted the admitted prior art discloses the fused deposition molding equipment includes a computer aided machine (CAM) operating in conjunction with a computer aided design procedure (CAD) as exemplified in Crump (Column 1, lines 15-24) which computers are considered to create a digital representation of the final three-dimensional object and control the fused deposition molding equipment to form the final three-dimensional object from a provided initial object representation in a digital format wherein the initial object representation has a surface geometry, the object built in the building step has a geometry defined according to the object representation, and the geometry attained following the exposing step approximately matches that of the initial object representation. The admitted prior art makes reference to Leyden as a known rapid prototyping technique. Leyden directed to rapid prototyping similar to the admitted prior art discloses the object is built oversize

so that after the surface roughness is removed the object will be the right size (Column 7, lines 25-36). It would have been obvious to one of ordinary skill in the art at the time the invention was made to include in the admitted prior art as exemplified in part by Crump and as modified by Joseph or Edmonds a step of modifying the initial object representation to pre-distort certain features of the surface geometry so that after the surface roughness is removed the object will be the right size as shown by Leyden.

9. Claims 18 and 48 are rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art as exemplified in part by Crump and Joseph or Edmonds as applied to claims 1-3, 8, 10, 11, 16, 18, 19, 21, 22, 27, 28, 33, 43-45, and 47-49 above, and further in view of Gessner (U.S. Patent 4,983,223).

As noted above, the object taught by the admitted prior art as exemplified in part by Crump and as modified by Joseph or Edmonds is exposed the vapors of the solvent by suspending the object on a wire mesh within a chamber containing the vapors of the solvent in a manner that substantially allows the entirety of the object surface to be exposed to the vapors of the solvent as shown by Joseph. It is noted "suspending" is given its usual definition of to keep from falling as if by hanging. In the event it is shown the term "suspending" by itself requires the object to be hanging by an attachment above as opposed to as if by hanging the following rejection would apply. It was known in the art to expose an object to vapors of a solvent by suspending the object in the vapors by hanging as shown by Gessner wherein suspending the object as shown by Gessner allows the process to be conducted in a such a manner that the solvent vapors are discharged into the atmosphere at a level much less than is conventional (Column 5, lines 59-63 and Column 6, lines 47-59). It would have been obvious to one of

ordinary skill in the art at the time the invention was made to expose the object to the vapors of the solvent as taught by the admitted prior art as exemplified in part by Crump and as modified by Joseph or Edmonds using a conveyor wherein the object is hanging as shown by Gessner whereby the object surfaces are exposed to the vapors of the solvent with the solvent vapors discharged into the atmosphere being much less than is conventional.

Response to Arguments

10. Applicant's arguments with respect to claims 1-5, 8, 10, 11, 16, 18-23, 27, 28, 33, 43-49 have been considered but are moot in view of the new ground(s) of rejection.

Applicants argue, "The Office Action contends that the surfaces of the articles smoothed in Joseph and Edmonds are similar to, or are the same as, the surfaces of articles built using a layered manufacturing rapid prototyping technique. However, as illustrated in FIG. 1 of the present application, the surface effects due to the layered manufacturing rapid prototyping technique extend substantially across the entire surface of the three-dimensional object, including the bottom surface 16 (present application, FIG. 1; page 2, lines 16-30; page 5, line 24 to page 6, line 2; and page 6, lines 17-20). This differs from surfaces merely having defects such as scratches, dents, blemishes, and small voids, or that merely require polishing. There is no recognition in Joseph or Edmonds, or any of the prior art of record to reduce surface effect(s) due to a layered manufacturing rapid prototyping technique, where the surface effect(s) extend substantially across an entirety of the object surface."

Joseph and Edmonds both teach exposing new thermoplastic object surfaces to vapors of a solvent to remove defects such as voids, cracks, scratches, and other surface roughness to uniformly smooth the object surface. Joseph or Edmonds expose substantially the entire surface of the object surface to the vapors of solvent. Thus, because the object taught by the admitted prior art as exemplified by Crumb is thermoplastic having a surface effect extending substantially entirely across an entirety of the object surface one of ordinary skill in the art would have had a reasonable expectation of success of smoothing the effect across the entirety of the object surface as the smoothing technique taught by Joseph or Edmonds is for thermoplastic object surfaces wherein substantially the entire surface of the object is exposed to the vapors of solvent.

Applicants further argue, “The claimed method of exposing the object to solvent vapors that transiently soften the modeling material at the object surface and reflowing the softened modeling material also reduces the porosity of the three-dimensional model substantially across the entire object surface (Medina Declaration, ¶ 2). This reduced porosity potentially seals the exposed area, which may create water-tight three-dimensional objects that can withstand pressure buildup (Medina Declaration, ¶ 2).”.

The declaration under 37 CFR 1.132 filed 3/27/09 has been considered. The declaration is insufficient to overcome the rejections for the following reasons:

The claims are not commensurate in scope with this argument as the claims do require sealing the exposed area with progressive vapor exposures ultimately creating water-tight 3D parts that can withstand pressure buildup. Claim 16 does require re-exposing the object surface. However, the 35 USC 112 first paragraph rejection above is noted. The declaration describes the reduced porosity as having a “potential to seal the exposed area”. There are no quantitative results to demonstrate sealing the exposed area and the statement in the declaration is not definitive. Finally, Joseph teaches the reflow fills voids in the objects surface such that reducing the porosity is not unexpected.

Conclusion

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **John L. Goff** whose telephone number is (571)272-1216. The examiner can normally be reached on M-F (7:15 AM - 3:45 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Crispino can be reached on (571) 272-1226. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/John L. Goff/
Primary Examiner, Art Unit 1791